" Ipad " Worlds' Most Touch Responsive

Device Is Also Works On Same Principle.

Resistive Touch Sensors

TOUCH HAND SHAKE

This is my Electronics Minor Project , In this project I've Created a touch responsive Doll I.e. I've just Install Touch Sensors in it & Have Programmed it to Do Some Specific Task .In the pic as we can See Doll has 6 LEDs Installed on its various body parts , these all LEDs are kind of Output for that Project. Rather I was Supposed to Create an Circuit only But to make my Project more Innovative & Good looking I Chose this method. I Chose this project myself as this Project plays the most Basic Principle In Todays' Most Innovative & Awesome " Touch Technology " . This Is the Same Technology that has been Using in Smartphones , Tablet PCs, Advanced Gaming Consoles etc.

So, That's' what my project Is !

I Do Hope Every Viewer Will like this Project , Thanxx

BY ABHI SHARMA

20/June/ 11

RESISTIVE TOUCH SENSORS

CONTENT LIST

INTRODUCTION TO SENSORS:

A sensor is a device that measures a physical quantity and converts it into a signal, which can be read by an observer or by an instrument. For example, a mercury-in-glass thermometer converts the measured temperature into expansion and contraction of a liquid, which can be read on a calibrated glass tube. A thermocouple converts temperature to an output voltage, which can be read by a voltmeter. For accuracy, most sensors are calibrated against known standards.

Sensors are used in everyday objects such as touch-sensitive elevator buttons (tactile sensor) and lamps, which dim or brighten by touching the base. There are also innumerable applications for sensors of which most people are never aware. Applications include mobile phones, cars, machines, aerospace, medicine, manufacturing and robotics.

A sensor is a device which receives and responds to a signal. A sensor's sensitivity indicates how much the sensor's output changes when the measured quantity changes. For instance, if the mercury in a thermometer moves 1 cm when the temperature changes by 1 °C, the sensitivity is 1 cm/°C. Sensors that measure very small changes must have very high sensitivities.
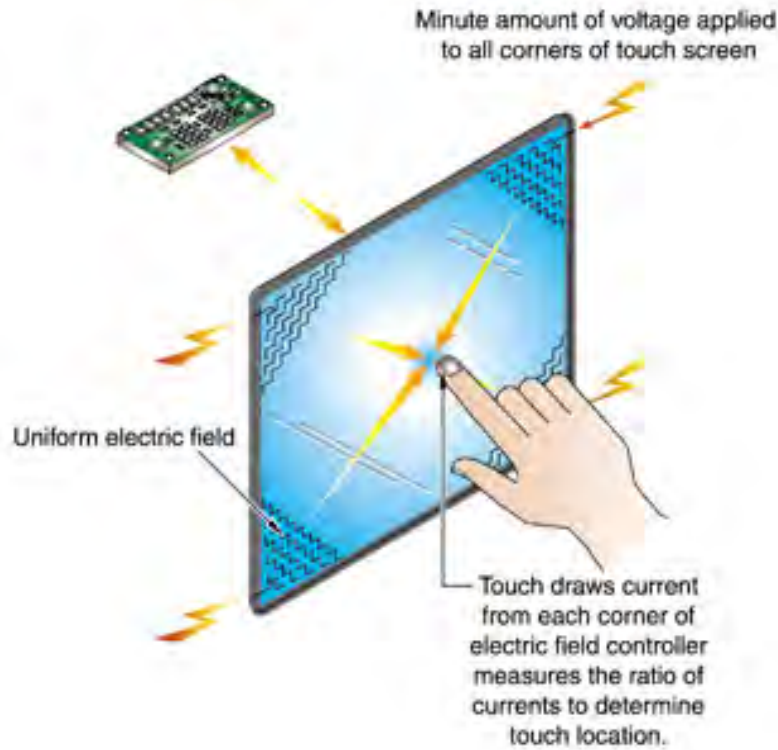
INTRODUCTION TO TOUCH SENSOR:

Touch sensing technology has the potential to replace most functions of the mouse and keyboard. The touchsensing interface is being used in a wide variety of applications to improve human-computer interaction. As the technology advances, people may be able to operate computers without mice and keyboards. Because of its convenience, touch screen technology solutions has been applied more and more to industries, applications, products and services, such as Kiosks, POS (Point-of-Sale), consumer electronics, tablet PC, moderate to harsh Machine Control, Process Control, System Control/Office Automation and Car PC, etc.

The touch panels themselves are based around four basic screen technologies: **Resistive, Capacitive, Infrared (IR),** and **Surface Acoustical Wave (SAW)**. Each of those designs has distinct advantages and disadvantages.

Sensor, That has been using in our Project is **'RESISTIVE TOUCH SENSOR'**

RESISTIVE TOUCH SENSOR:

Resistive touch sensors consist of several panels coated with a metallic film, such as ITO (indium tin oxide), which is a transparent and electrically conductive. Thin spacer dots separate the panels from each other. When something, such as a finger (gloved or bare) or a stylus presses on the layers, it causes the two panels to make contact and closes an electrical circuit so that a controller can detect and calculate where the pressure is being applied to the panels. The controller can communicate the position of the pressure point as a coordinate to the application software.

Minute amount of voltage applied to all corners of touch screen

Uniform electric field

Touch draws current from each corner of electric field controller measures the ratio of currents to determine touch location.

Because the touch sensor relies on pressure on its surface to measure a touch, a user can use any object to make the contact; although using sharp objects can damage the layers. This is in contrast to other types of touch sensors, such as capacitive sensors, which require the object making contact with the touch surface, such as a finger, to be conductive.
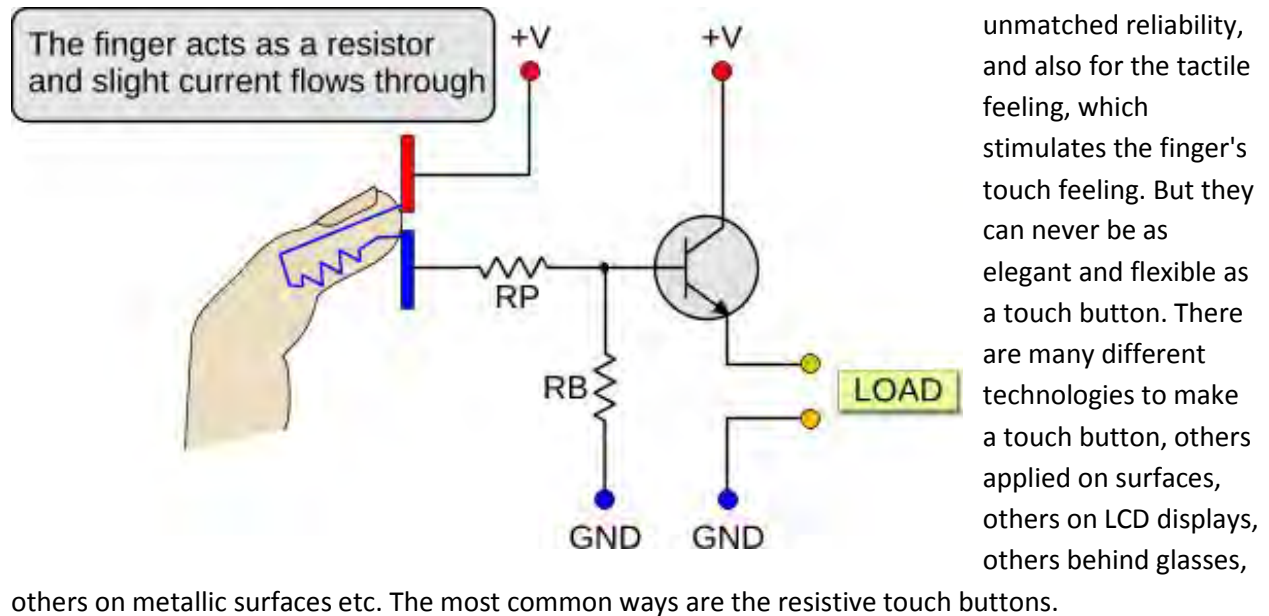
Resistive touch sensors are generally durable and less expensive than other touch technologies; this contributes to their wide use in many applications. However, resistive touch sensors offer a lower visual clarity (transmitting about 75% of the display luminance) than other touch technologies. Resistive touch sensors also suffer from a high reflectivity with high ambient light conditions, and this can degrade the perceived contrast ratio of the displayed image.

When a user touches the resistive touch sensor, the top layer of the sensor experiences a mechanical bouncing from the vibration of the pressure. This affects the decay time necessary for the system to reach a stable DC value to determine a position measurement.

HOW RESISTIVE TOUCH SENSOR WORKS:

Mechanical buttons and switches cannot become obsolete for various reasons. First because of the unmatched reliability, and also for the tactile feeling, which stimulates the finger's touch feeling. But they can never be as elegant and flexible as a touch button. There are many different technologies to make a touch button, others applied on surfaces, others on LCD displays, others behind glasses, others on metallic surfaces etc. The most common ways are the resistive touch buttons.
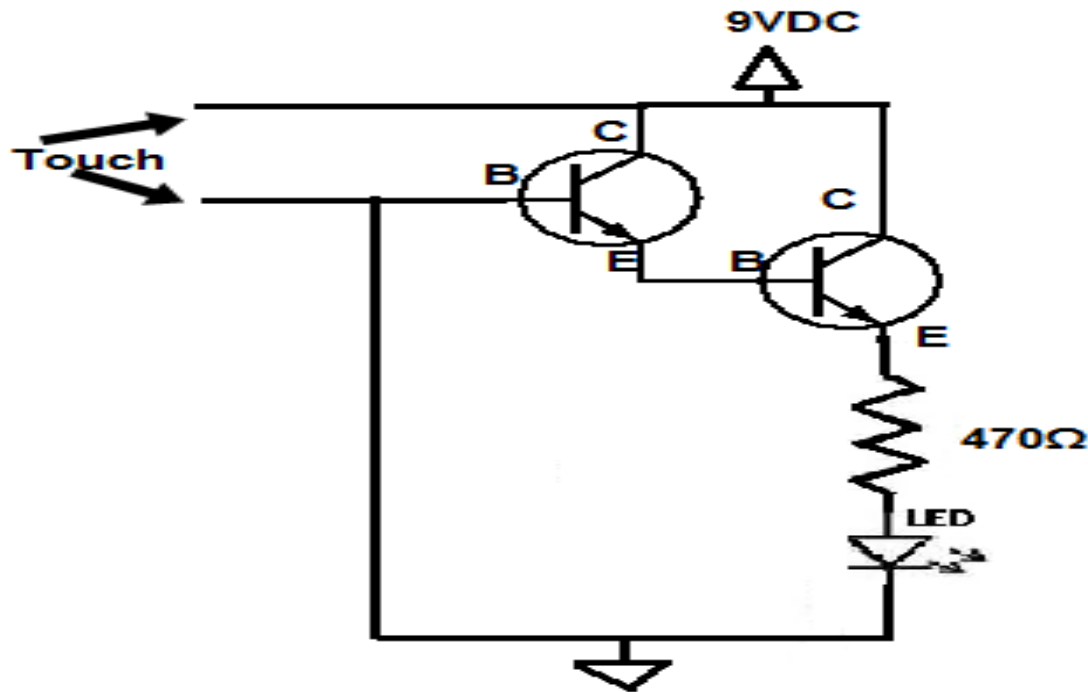
The resistance touch switch is based on the fact that human tissues (like the skin), have a great amount of water and salt, something that makes it conductive.

This is the most basic type of touch switch, in its simplest form. The operation is simple. A transistor is used as a switch. The RB resistor keeps the base to ground when no electrode is touched, so it does not float. The RP resistor is for protection, in case that the electrodes are short-circuited, and it prevents an over current that will probably toast the transistor. If one of the electrodes is touched, nothing will happen. But if both electrodes are touched together, then a small amount of current will flow through the skin to the base of the transistor. The transistor will then go from cut-off to saturation, and current will flow from the CE region to the LOAD.

There are numerous different ways to implement a resistance touch switch, with transistors, with 555, with 741, with CMOS and many more. The idea is always the same though: Two electrodes are used for the touch plates. Current flow from the human skin from one electrode to the other, which finally stimulates an amplifier or other current sensitive parts. This touch sensor circuit works because the two transistors in series, called a Darlington configuration, gives extremely high current amplification. With two NPN transistors in series, the current amplification equals the product of the gain of the two transistors. So if each transistor has a gain of 500, then the current amplification that the two transistors provide together is 2500. So if an LED carries a current of 15mA, the base current needed to light the

LED only needs to be a mere 6µA, a very small amount of current. For this project, we are going to light the LED by the current flowing through our body, which is a resistor. Even though our body has a substantial amount of resistance, and thus, only gives out little current because of this high resistance, the Darlington configuration in the circuit amplifies current so greatly that it's still sufficient to light the LED.

Proceeding to Circuit diagram of ' Resistive Touch Sensor '

Circuit Diagram of Resistive Touch Sensor

COMPONENTS USED IN RESISTIVE TOUCH SENSOR:

❖ PRINTED CIRCUIT BOARD:

A printed circuit board, or PCB, is used to mechanically support and electrically connect electronic components using conductive pathways, tracks or signal traces etched from copper sheets laminated onto a non-conductive substrate. It is also referred to as printed wiring board (PWB) or etched wiring board. A PCB populated with electronic components is a printed circuit assembly (PCA), also known as a
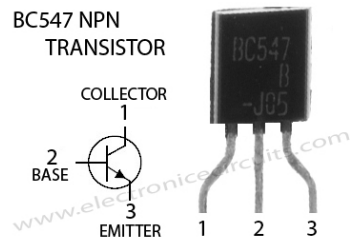
printed circuit board assembly (PCBA). Printed circuit boards are used in virtually all but the simplest commercially produced electronic devices.

PCBs are inexpensive, and can be highly reliable. They require much more layout effort and higher initial cost than either wire wrap or point-to-point construction, but are much cheaper and faster for high-volume production; the production and soldering of PCBs can be done by totally automated equipment. Much of the electronics industry's PCB design, assembly, and quality control needs are set by standards that are published by the IPC organization.

❖ BC 547 N-P-N TRANSISTOR:

A transistor is a semiconductor device used to amplify and switch electronic signals. It is made of a solid piece of semiconductor material, with at least three terminals for connection to an external circuit. A voltage or current applied to one pair of the transistor's terminals changes the current flowing through another pair of terminals. Because the controlled (output) power can be much more than the controlling (input) power, the transistor provides amplification of a signal. Today, some transistors are packaged individually, but many more are found embedded in integrated circuits.

The transistor is the fundamental building block of electronic devices, and is ubiquitous in modern electronic Following its release in the early 1950s the transistor revolutionized the field of electronics, and paved the way and cheaper radios, calculators, and computers, among modern systems. for smaller other things.

❖ RESISTORS:

Resistor is An electrical device that resists the flow of electrical current. The main purpose behind it's usage is that opposes the current at great effort , so don't let the circuit to spoil by accidental apply of high voltage supply. It is Widely used in both Electrical as well as Electronic Industry. Here in this touch sensitive circuit we've used to resistors as 1k ohm & 100k ohm but we can also use 470k ohms one resistors Instead of using past twos'.
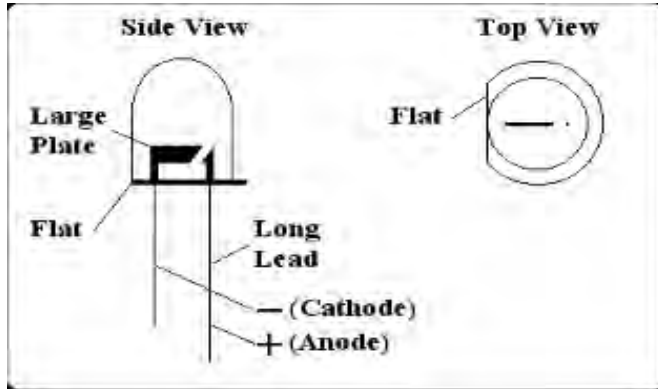
❖ LIGHT EMITTING DIODE (LED):

A light-emitting diode (LED) is a semiconductor light source.LEDs are used as indicator lamps in many devices and are increasingly used for other lighting. Introduced as a practical electronic component in

1962,early LEDs emitted low-intensity red light, but modern versions are available across the visible, ultraviolet and infrared wavelengths, with very high brightness.

When a light-emitting diode is forward biased (switched on), electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence and the color of the light (corresponding to the energy of the photon) is determined by the energy gap of the semiconductor.

An LED is often small in area (less than 1 mm2), and integrated optical components may be used to shape its radiation pattern. LEDs present many advantages over incandescent light sources including lower energy consumption, longer lifetime, improved robustness, smaller size, faster switching, and greater durability and reliability. LEDs powerful enough for room lighting are relatively expensive and require more precise current and heat management than compact fluorescent lamp sources of comparable output.

❖ 9V BATTERY & BATTERY SNAPPER:

9v battery is must use material in touch resistive sensor. it is widely available throughout every where , rather we can use higher voltage batteries as well but Acc. To the circuits' demand , if we don't have small battery as 9v then we can use higher voltage battery in this circuit but for that we need to install for resistors to control the circuit to become over charge   .

For a quick way to tell if there's charge left in a 9 volt battery, briefly touch the contacts together with your tongue. If there's juice in the battery you'll get a tiny shock (and a nasty metallic taste). It's not enough voltage to hurt you but it's definitely not pleasant and you wouldn't want to test a bunch of batteries this way.

Battery snapper is used to make the usage of battery more easy & risk free, it's main & most important wok is to control the accidental flow of charge , it's only used for safety purposes.

❖ TOUCH PAD:

It is the most important & most least come apparatus in the touch sensing circuits. A touch pad can be anything like any type of ' Conducting Material '.For example, the touch pad can be a penny, or a piece of conductive glass. The important work of touch pad that it works like an actual touch sensor , when a person puts his hand near the touch pad then it sends the responsive message to the circuit and then circuit start doing work , On what purpose it has design for. As we know touch pad can be any kind a material So we can use a Coin ,wire , metal piece or whatever we like to use.

The circular figure that we are seeing in the very center of the hand is the touch pad & it is made of kind a Indium Tin Oxide (ITO), because , it is most widely used conductive & transparent material in the field of electronics. This same material is used In Touch Screen monitors etc.

A Touch Sensor pad has a wide operating range, adjustable sensitivity, and is moisture and contaminant resistant. Touch Sensor pads are easily integrated into

Touch Hand Shake   current and new interface designs with no need for electronic modification. Because no software is required, they are a direct, easy and aesthetic replacement for membrane and mechanical switches.

CONCEPT OF TOUCH HAND SHAKE:

As we know, this project was all about touch & response. So , To feel more Innovative & great we chose the concept to create '**A Touch Responsive Doll** '.So we just buy a baby doll from market , Install the touch sensors & circuit inside it. To getting output we used 6 LEDs , rather we were more curious to install other output devices like some more multi-color LEDs or may be small 8 ohms Speaker , or anything else, but due to the 9v battery limitation & very small space to installation (Inside the Doll) , we didn't dare to do that. Rather, we think that is enough efforts for beginners like us. Here is the Configuration below.

CONFIGURATION OF TOUCH HAND SHAKE:

As we can See in the modal, We have created a baby doll. We've Install Six LEDs in the Doll, Two are at it's Ears , Two are at it's knees & Rest of two are at it's Arms near the bends. The process of Installation is done by using Cutter , Solder , Soldering Wire , Gluee & Very thin Copper wire (To Install Touch Pad). The Configuration Inside the doll to Apply Apparatus is As Simple As In any hollow body, We have just Cut the Doll at the most Appropriate parts & then Install the circuit & then Re-Set is by using strong Adhesive Gluee.

Step By Step Configuration of Touch Sensing Doll :

o   First we cut the Doll at the most Appropriate parts ,like its' bends or the body part under its clothes , Cuz, It shouldn't look Shabby.
o   Then, We Install the LEDs inside the Doll With the help of Torch, Safety Pins & stuff that was much more helpful.
o   Then, we put the circuit inside the doll , We try to make sure that the circuit can come out anytime we want in case of any trouble shooting.
o   Then, we Re-Set the whole Doll modal with the help of Strong Adhesive Glue , like Fevi Quick.
o   Then , we put the doll in the big black thermo kohl board .
o   Then, It was ready to work.
o   The whole cost of this project was near about Rs. 150.

As We can Estimate from the Name "Touch Handshake" The Input in Dolls' Modal is It's both Hands,

We've used two touch Sensitive materials (kind of ITO) As Shown In fig. The round figure at the very centre of the hand in doll is 'Touchpad' , It is very Responsive to any type of touch & also Gives the Very Appropriate & fast output In the Form of Glowing LEDs. The Doll modal has been prepared to Give the futuristic & more practical example of Innovation & Willingness…
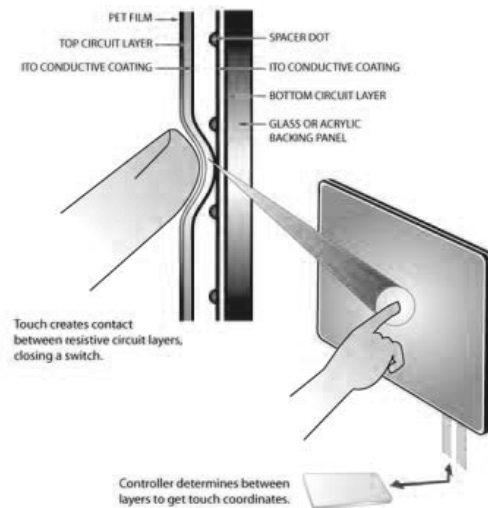
APPLICATIONS OF RESISTIVE TOUCH TECHNOLOGY:

The Biggest application of Resistive Touch sensors is that it plays the basic principle behind

'RESISTIVE TOUCH SCREEN TECHNOLOGY'

Resistive touchscreens are touch-sensitive computer displays composed of two flexible sheets coated with a resistive material and separated by an air gap or microdots. When contact is made to the surface of the touchscreen, the two sheets are pressed together. On these two sheets there are horizontal and vertical lines that when pushed together, register the precise location of the touch. Because the touchscreen senses input from contact with nearly any object (finger, stylus/pen, palm) resistive touchscreens are a type of "passive" technology.

For example, during operation of a four-wire touchscreen, a uniform, unidirectional voltage gradient is applied to the first sheet. When the two sheets are pressed together, the second sheet measures the voltage as distance along the first sheet, providing the X coordinate. When this contact coordinate has been acquired, the uniform voltage gradient is applied to the second sheet to ascertain the Y coordinate. These operations occur within a few milliseconds, registering the exact touch location as contact is made.

Resistive touchscreens typically have high resolution (4096 x 4096 DPI or higher), providing accurate touch control. Because the touchscreen responds to pressure on its surface, contact can be made with a finger or any other pointing device.

INDUSTRIAL AUTOMATION

Reliability and efficiency in automation applications has proven to be enhanced by the introduction of Touch Sensor technology. Recognized as "fail safe" by UL, TouchSensor has a wide operating range from – 40°C to 115° C, and has passed industrial levels of IEC specifications for electrical noise. Touch Sensor products are deployed in the industrial setting for human touch control, liquid level and position sensing applications.

DIGITAL MATRIX

Digital Matrix touchscreen provides greater flexibility than traditional membrane switches allowing on-screen soft buttons, which can be easily modified, upgraded, or expanded. In contrast, a membrane switch requires a change in hardware to redefine button layout or functionality. TouchTekDM can also be used in hybrid applications where buttons defined by graphics are printed around the touchscreen perimeter, similar to a membrane switch, except with a transparent window over the LCD for customizable functions.

For TouchTekDM, the ITO conductive material is patterned into rows and columns in the form of a grid. Each etched layer has a voltage connection. When the layers are pressed together, cur-rent flows through the row and column where the touch occurs to calculate the position of the touch.

MULTI-TOUCH SCREEN

In computing, **multi-touch** refers to a touch sensing surface's (track pad or touchscreen) ability to recognize the presence of two or more points of contact with the surface. This plural-point awareness is often used to implement advanced   functionality such as pinch to zoom or activating predefined programs.

To stay smooth and pristine, the new Multi-Touch trackpad is made from wear-resistant etched glass.

In an effort of disambiguation or   marketing classification, some companies further breakdown   the various definitions of multi-touch. An example of this is 3M defining multi-touch as a touch-screen's ability to register three or more distinct positions.
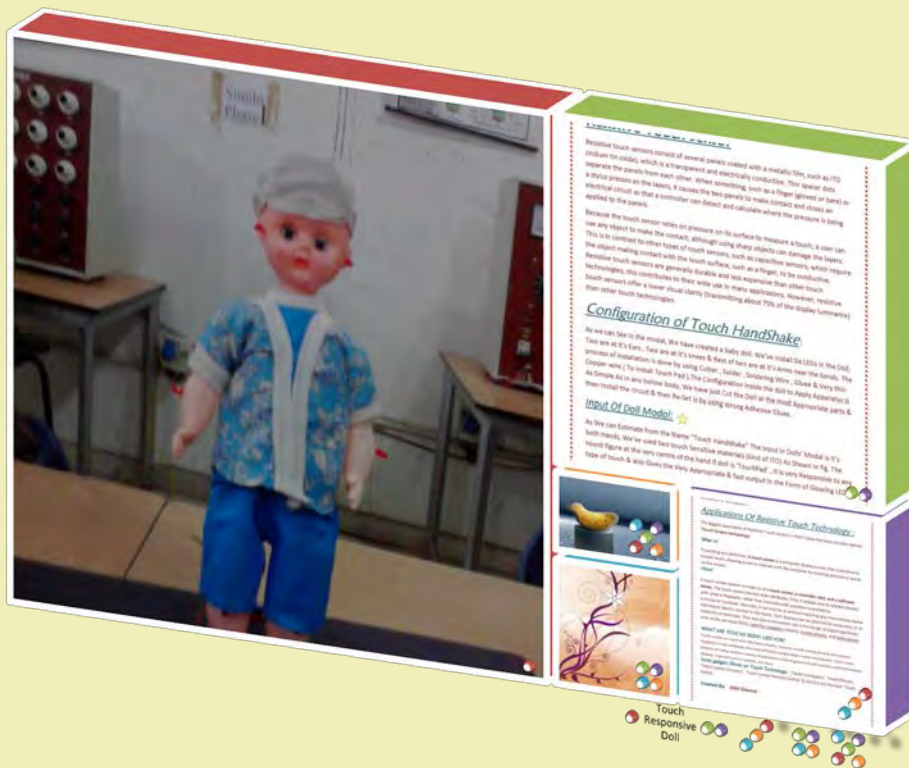
SOME GADGETS, WORKS ON TOUCH TECHNOLOGY:

'TABLET COMPUTERS'----- like *Apple's iPad , Notion Ink's Adam , Samsung's Galaxy Tab , Motorola's XooM etc.*

'SMART PHONES'----like **Google's** *Nexus One, Micromax's X600 , iPhone , Other Smart Phones etc.*

'VIDEO GAMES CONSOLES'---like *Microsoft's Kinet , Sony's PSP , Nintendo's etc*.

'TOUCH SWITCH '--- like *In Cars touch screen to Show about the speed etc. & to give the*

Notifications they are known as Touch Switch.

ADDITIONAL STUFF

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*Below document is also the part of " **Resistive Touch Technology** " Project but it is much ' briefer ' than the Above portion As I was also supposed to paste two page document of my project on Actual Modal of Doll , So below portion is very much briefer yet as important as above....*

Check Out for more....&... I've also post a video on **"YouTube"** *of my project & I've provide the related link of that video here So ,*

DO CHECK THE VIDEO...

Heres' The Link Below :

http://youtu.be/ew_SCXq0hs8

Resistive Touch Sensor

Resistive touch sensors consist of several panels coated with a metallic film, such as ITO (indium tin oxide), which is a transparent and electrically conductive. Thin spacer dots separate the panels from each other. When something, such as a finger (gloved or bare) or a stylus presses on the layers, it causes the two panels to make contact and closes an electrical circuit so that a controller can detect and calculate where the pressure is being applied to the panels.

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Applications Of Resistive Touch Technology :

The Biggest application of Resistive Touch sensors is that it plays the basic principle behind **'Touch Screen technology'**.

What is?

If counting as a definition, **A touch screen** is a computer display screen that is sensitive to human touch, allowing a user to interact with the computer by touching pictures or words on the screen.

How?

A touch screen system is made up of a **touch sensor, a controller card, and a software driver.** The touch screen has two main attributes. First, it enables one to interact directly with what is displayed, rather than indirectly with a pointer controlled by a mouse or touchpad. Secondly, it lets one do so without requiring any intermediate device that would need to be held in the hands. Such displays can be attached to computers, or to networks as terminals. They also play a prominent role in the design of digital appliances such as the personal (PDA), satellite navigation devices, mobile phones, and video games.

WHAT ARE TOUCHSCREENS USED FOR?

Touch screens are used with information kiosks, computer-based training devices, and systems designed to help individuals who have difficulty manipulating a mouse or keyboard. Touch screen systems are being used in a variety of applications, including point-of-sale systems, public information displays, industrial control systems, and more.

Some gadgets,Works on Touch Technology: 'Tablet Computers', 'Smart Phones', 'Video Games Consoles', 'Touch Screen Remote Control' & last but not the least 'Touch Switch '.

Created By: Abhi Sharma